

Name: _____

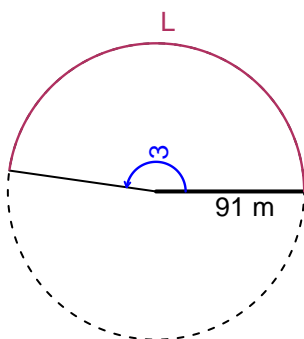
Date: _____

Trig Final (SLTN v673)

- You should have a calculator (like [Desmos](#)) and a [unit-circle](#) reference sheet.

Question 1

In the figure below, we see a circle and a central angle that subtends an arc. The radius is 91 meters. The angle measure is 3 radians. How long is the arc in meters?

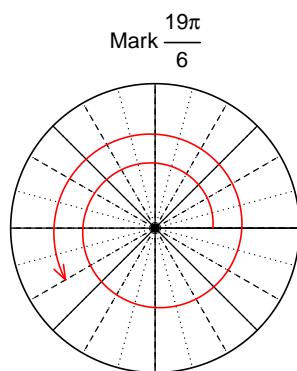


$$\theta = \frac{L}{r} \quad r = \frac{L}{\theta} \quad L = r\theta$$

$L = 273$ meters.

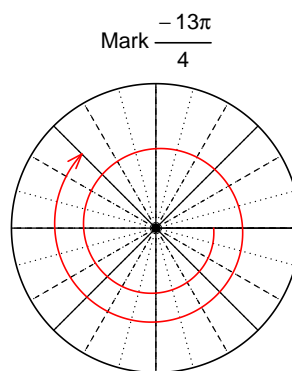
Question 2

Consider angles $\frac{19\pi}{6}$ and $-\frac{13\pi}{4}$. For each angle, use a spiral with an arrow head to **mark** the angle on a circle below in standard position. Then, find **exact** expressions for $\cos\left(\frac{19\pi}{6}\right)$ and $\sin\left(-\frac{13\pi}{4}\right)$ by using a unit circle (provided separately).



Find $\cos(19\pi/6)$

$$\cos(19\pi/6) = \frac{\sqrt{3}}{2}$$



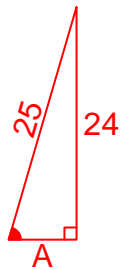
Find $\sin(-13\pi/4)$

$$\sin(-13\pi/4) = -\frac{\sqrt{2}}{2}$$

Question 3

If $\sin(\theta) = \frac{-24}{25}$, and θ is in quadrant III, determine an exact value for $\tan(\theta)$.

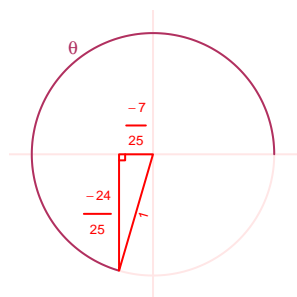
Ignore any negatives and the quadrant, and draw a right triangle (based on SOHCAHTOA) in standard (quadrant I) orientation.



Solve the Pythagorean Equation

$$\begin{aligned}A^2 + 24^2 &= 25^2 \\A &= \sqrt{25^2 - 24^2} \\A &= 7\end{aligned}$$

Rescale the triangle so the hypotenuse is 1. Reflect the triangle into Quadrant III in a unit circle.



$$\tan(\theta) = \frac{\frac{-24}{25}}{\frac{-7}{25}} = \frac{24}{7}$$

Question 4

A mass-spring system oscillates vertically with a midline at $y = 3.15$ meters, an amplitude of 5.37 meters, and a frequency of 2.02 Hz. At $t = 0$, the mass is at the maximum height. Write an equation to model the height (y in meters) as a function of time (t in seconds).

Any of these equations would get full credit.

$$y = 5.37 \cos(2\pi 2.02t) + 3.15$$

or

$$y = 5.37 \cos(4.04\pi t) + 3.15$$

or

$$y = 5.37 \cos(12.69t) + 3.15$$